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ANNUAL REPORT

1916

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TABLE 1. Summary of the results of the regression analysis

Variable	Mean	Standard deviation	Minimum	Maximum
1. Age	35.2	12.5	18	65
2. Sex	1.2	0.4	0	2
3. Education	12.5	2.5	8	16
4. Income	15.5	5.5	10	25
5. Health	1.5	0.5	0	3
6. Employment	1.5	0.5	0	3
7. Unemployment	1.5	0.5	0	3
8. Disability	1.5	0.5	0	3
9. Family size	2.5	1.5	0	6
10. Marital status	1.5	0.5	0	3
11. Divorced	1.5	0.5	0	3
12. Widowed	1.5	0.5	0	3
13. Single	1.5	0.5	0	3
14. Married	1.5	0.5	0	3
15. Cohabiting	1.5	0.5	0	3
16. Partnered	1.5	0.5	0	3
17. Separated	1.5	0.5	0	3
18. Divorced	1.5	0.5	0	3
19. Widowed	1.5	0.5	0	3
20. Single	1.5	0.5	0	3
21. Married	1.5	0.5	0	3
22. Cohabiting	1.5	0.5	0	3
23. Partnered	1.5	0.5	0	3
24. Separated	1.5	0.5	0	3
25. Divorced	1.5	0.5	0	3
26. Widowed	1.5	0.5	0	3
27. Single	1.5	0.5	0	3
28. Married	1.5	0.5	0	3
29. Cohabiting	1.5	0.5	0	3
30. Partnered	1.5	0.5	0	3
31. Separated	1.5	0.5	0	3
32. Divorced	1.5	0.5	0	3
33. Widowed	1.5	0.5	0	3
34. Single	1.5	0.5	0	3
35. Married	1.5	0.5	0	3
36. Cohabiting	1.5	0.5	0	3
37. Partnered	1.5	0.5	0	3
38. Separated	1.5	0.5	0	3
39. Divorced	1.5	0.5	0	3
40. Widowed	1.5	0.5	0	3
41. Single	1.5	0.5	0	3
42. Married	1.5	0.5	0	3
43. Cohabiting	1.5	0.5	0	3
44. Partnered	1.5	0.5	0	3
45. Separated	1.5	0.5	0	3
46. Divorced	1.5	0.5	0	3
47. Widowed	1.5	0.5	0	3
48. Single	1.5	0.5	0	3
49. Married	1.5	0.5	0	3
50. Cohabiting	1.5	0.5	0	3
51. Partnered	1.5	0.5	0	3
52. Separated	1.5	0.5	0	3
53. Divorced	1.5	0.5	0	3
54. Widowed	1.5	0.5	0	3
55. Single	1.5	0.5	0	3
56. Married	1.5	0.5	0	3
57. Cohabiting	1.5	0.5	0	3
58. Partnered	1.5	0.5	0	3
59. Separated	1.5	0.5	0	3
60. Divorced	1.5	0.5	0	3
61. Widowed	1.5	0.5	0	3
62. Single	1.5	0.5	0	3
63. Married	1.5	0.5	0	3
64. Cohabiting	1.5	0.5	0	3
65. Partnered	1.5	0.5	0	3
66. Separated	1.5	0.5	0	3
67. Divorced	1.5	0.5	0	3
68. Widowed	1.5	0.5	0	3
69. Single	1.5	0.5	0	3
70. Married	1.5	0.5	0	3
71. Cohabiting	1.5	0.5	0	3
72. Partnered	1.5	0.5	0	3
73. Separated	1.5	0.5	0	3
74. Divorced	1.5	0.5	0	3
75. Widowed	1.5	0.5	0	3
76. Single	1.5	0.5	0	3
77. Married	1.5	0.5	0	3
78. Cohabiting	1.5	0.5	0	3
79. Partnered	1.5	0.5	0	3
80. Separated	1.5	0.5	0	3
81. Divorced	1.5	0.5	0	3
82. Widowed	1.5	0.5	0	3
83. Single	1.5	0.5	0	3
84. Married	1.5	0.5	0	3
85. Cohabiting	1.5	0.5	0	3
86. Partnered	1.5	0.5	0	3
87. Separated	1.5	0.5	0	3
88. Divorced	1.5	0.5	0	3
89. Widowed	1.5	0.5	0	3
90. Single	1.5	0.5	0	3
91. Married	1.5	0.5	0	3
92. Cohabiting	1.5	0.5	0	3
93. Partnered	1.5	0.5	0	3
94. Separated	1.5	0.5	0	3
95. Divorced	1.5	0.5	0	3
96. Widowed	1.5	0.5	0	3
97. Single	1.5	0.5	0	3
98. Married	1.5	0.5	0	3
99. Cohabiting	1.5	0.5	0	3
100. Partnered	1.5	0.5	0	3

GENERAL STATEMENT

The Yellowstone National Park, set aside by act of March 1, 1872 (secs. 2474 and 2475. R. S.; 17 Stat., 32), is located in the States of Wyoming, Montana, and Idaho. It has an area of about 2,142,720 acres and an average altitude of about 8,000 feet.

The military force available for duty in the park consists of a detachment of 200 soldiers of the Cavalry Arm of the service, trained in the different Cavalry regiments and detached therefrom for this special service.

The headquarters is located at Fort Yellowstone, but the command also garrisons 15 soldier stations scattered throughout the park, requiring 123 men during the tourist season and 75 during the remainder of the year.

A telephone system connects the soldier stations and the post.

In addition to the military force which is maintained by the War Department, the Interior Department furnishes certain civilian employees, namely, a clerk, scouts, a buffalo keeper, etc.

The officers and men of the military command, and the civilian employees, performed their duties in a most satisfactory manner.

TRAVEL

A severe winter with deep snow was followed by a late spring featured by a gale which continued for five days, doing great damage to the telephone system and closing the roads with uprooted trees. The men of the command repaired the telephone lines and made the roads passable for all kinds of travel.

Though there were many obstacles to overcome, such as deep snows and washouts, the belt line and the north and west approaches were opened on schedule time. The Cody-Sylvan Pass-Lake Road was opened to wagons on June 27, and to automobiles on June 29. The Cody-Sylvan Pass Motor Co. began operations on July 1, as advertised.

The first vehicle came in from the south on June 26.

The Giffenden Road, from the Canyon to Tower Falls, presented the greatest difficulties, as the snow, from 8 to 10 feet in depth, was packed solid for some 6 miles in Dreyer Pass and its approaches. This road was open to wagons on July 5, and to automobiles on July 6.

The aggregate number of persons taking short trips during the season of 1916 was as follows:

TRAVEL DURING THE SEASON OF 1916

Entering via the northern entrance with the Yellowstone Park Transportation Co.-----	3,753	
Entering via the western entrance with Yellowstone-Western Stage Co.-----	3,657	
Entering via eastern entrance with Cody-Sylvan Pass Motor Co	1,293	
Ellic Perseus Camping Co.:		
Entering via northern entrance-----	2,155	
Entering via western entrance-----	2,872	5,027
Shaw & Howell Camping Co.:		
Entering via northern entrance-----	1,361	
Entering via western entrance-----	369	1,730
Old Faithful Camping Co. (Hufferlin Camps):		
Entering via northern entrance-----	353	
Entering via western entrance-----	53	306
With other licensees of personally conducted camping parties--	100	
Making wax trips with private transportation:		
With automobiles, trip tickets-----	15,026	
With automobiles, season tickets-----	2,504	14,530

With other private transportation, as "private camping parties"----- 2,325

Miscellaneous short trips----- 280

Winter trips--special excursions to view game----- 2,073

Grand total----- 35,299

The Yellowstone Park Hotel Co. reports that 7,876 people were accommodated at the hotels in the park during the season of 1916, of which 3,862 entered at the northern entrance, 3,653 at the western entrance, and 361 at the eastern entrance.

The Yellowstone Park Boat Co. reports that 2,558 people took the boat trip across Yellowstone Lake during the season, of which 1,237 were traveling with Yellowstone Park Transportation Co., 1021 with Yellowstone-Western Stage Co., 247 with Tylio Camping Co., and 53 with Shaw & Powell Camping Co.

TRAVEL BY THE DIFFERENT ENTRANCES

From the north, via Gardiner, Mont----- 17,589
 From the west, via Yellowstone, Mont----- 13,261
 From the east, via Cody, Wyo----- 4,593
 From the south, via Jackson, Wyo----- 395
 From the northeast, via Cooke, Mont----- 11

Total----- 35,849

AUTOMOBILE TRAVEL

	Automo- biles	Tourists
Entering via the northern entrance.....	1,264	4,225
Entering via the western entrance.....	1,291	5,234
Entering via the eastern entrance.....	754	2,754
Entering via the southern entrance.....	31	113
Total automobile travel on trip tickets.....	3,340	12,326
Automobile travel, season tickets.....	105	2,004
Total automobile travel on paid tickets.....	3,445	14,330
Entering with Cody-Sylvan Pass Motor Co-----		1,293
Grand total of parties entering with automobiles.....		16,223

The automobile travel is included in the aggregate number of tourists making park trips as shown on the preceding page.

Attention is invited to the fact that parties traveling in automobiles are not included in the reports of numbers accommodated during the season at hotels and permanent camps.

During the year 1916, 202 personally conducted camping permits were issued as follows:

Entering at northern entrance-----	83
Entering at both northern and western entrances-----	37
Entering at western entrance-----	4
Entering at eastern entrance-----	68
Entering at southern entrance-----	10

The travel by way of Tower Falls by regular tourists returning to Mammoth Hot Springs from Grand Canyon was encouraged by some of the transportation companies, the Yellowstone-Western Stage Co. alone transporting over this scenic route 698 tourists. Most of those touring the park in automobiles took the Mount Washburn route and were most enthusiastic over the scenery.

In addition to the transportation furnished by the regular companies, movable camp licenses were issued during the season covering a total of 37 wagons and 309 saddle and pack animals, and one special wagon for livery work.

The columns of the daily papers and the orders of the railroad officials to stop the shipment of perishable goods which could not be delivered before the day set for the strike and other reliable information convinced the president of the hotel company that the railroad strike was inevitable. He, in accordance with this



belief, at 11 o'clock p. m. of August 30, decided that all tourists at the hotels be taken direct to the railroad stations. The movement commenced early the morning of August 31, and was so expeditiously managed that the tourists had departed, the help sent away, and the hotels closed by September 2.

The imminence of the railroad strike deterred many from journeying far from home. This is unmistakable, as the travel to the park which was excellent prior to the alarming period of the contention fell to almost nothing for the remainder of the season.

The Wylie Camping Co. closed to tourists early in the month of September. The Shaw & Powell Camping Co. and Old Faithful Camping Co. continued to give tourists full service, as advertised, to the end of the season.

CODY-SYLVAN PASS MOTOR CO.

On June 6, 1916, a concession was granted the Cody-Sylvan Pass Motor Co., authorizing it for the term of one year from January 1, 1916, to establish and maintain an automobile transportation line for the accommodation of persons desiring to enter the park via the eastern entrance. This company operated from Cody, Wyo., to the eastern entrance, thence inside of the park to the Yellowstone Lake, where they turned their patrons over to the transportation companies operating horse-drawn vehicles. The business of the new company was conducted in a very satisfactory manner. A total of 1,293 passengers entered the park



with it, of which 258 were turned over to the Yellowstone Park Transportation Co., 113 to the Yellowstone-Western Stage Co., 710 to the Wylie Permanent Camping Co., 174 to the Shaw & Powell Camping Co., and the balance of 78 were transients. The company also carried a total of 3,109 tourists out of the park from Lake Outlet to the eastern entrance, which were taken from the various transportation companies.

AUTOMOBILES

There were 3,445 automobiles carrying 14,930 tourists from June 15 to September 30. Of these, 2,994 came in on season tickets and 12,926 on the regular tickets of passage. These tourists came from 40 States, and nearly every known make of automobiles was represented. This includes, in addition to the regularly purchased tickets, complimentary tickets to county, State, and Federal officials in the park on official business.

The automobilists almost without exception adhered closely to the automobile regulations and followed strictly the schedules, which proved quite popular.

As the roads approaching the several entrances of the park improve, the automobile travel will increase, and the park will in time become one of the great resorts of the country.

To make this a possibility, the Park-to-Park Highway Association held a most enthusiastic convention at the Canyon Hotel July 24-25



and started a movement for good roads from all the contiguous States to the parks and within the States.

Mr. Robert I. McKay, of Cooke, Montana, to whom a permit was issued last year to use automobile trucks and trailers for transporting ore and supplies between Gardiner and Cooke, Montana, used but one truck and trailer and one utility car last season, and up to this date he has failed to make arrangements for renewal of his privilege. His reports indicate that he expended \$11,857.63 in repairing the roads under his contract with the department. Similar permits for use of the park roads between Gardiner and Cooke have been given for the present season as follows:

One to Nels E. Solderholm, a merchant of Cooke, for use of one 2-ton truck for hauling his own supplies and employees.

One to G. L. Tanzer, president of the Western Smelting & Power Co., of Seattle, Wash., with mining interests in Cooke, for a 2-ton automobile truck, a 3-ton trailer for sale, and a utility or repair car, with privilege of increasing the number to 41 vehicles if desired. These permits were granted under the same requirements as was Mr. McKay's last year--namely, that the licensees pay a fee of \$20 per annum for each truck used, \$10 per annum for each trailer used, and \$10 per annum for the utility or repair car. Mr. Solderholm has had his truck in commission since about July 1. Mr. Tanzer has ordered a truck and trailer, but it has not been received and put into commission.



More than 50 motor cars and trucks have been in use by the different branches of the Government and concessionaires in the park in hauling supplies and work other than transporting tourists.

STREAM GAGING

Mr. G. Clyde Baldwin, district engineer of the water-resources branch of the United States Geological Survey, with headquarters at Boise, Idaho, who has charge of this important feature, has furnished the following report on this work for the year:

Records were obtained from the following gaging stations, which were established during June, 1913:

Madison River, near Yellowstone, Mont.
Gibbon River, at Wylie Lunch Station, near Yellowstone, Mont.
Yellowstone River, above Upper Falls, near Canyon Station.
Snake River, at south boundary Yellowstone National Park.

During July, 1915, the sum of \$1,000 was apportioned from Yellowstone Park funds to assist in carrying on the stream-gaging work during the fiscal year ending June 30, 1917. In consequence plans were made for the installation of a water-stage recorder at the station on Yellowstone River and for the purchase and erection of cables from which to secure current water measurements at this station and also at the one on Snake River.

The installation of this equipment which was in progress at the end of September, 1916, will make it possible to secure dependable records at these stations for high stages of flow.



The water-stage recorder will be located close to the Upper Falls of Yellowstone River and will be housed in such a manner as to permit inspection by tourists. Later it is proposed to post rating tables in prominent places in order to enable tourists to determine from the observed gage reading the actual quantity of water passing over these falls.

Detailed descriptions of the gaging stations, together with summaries of current meter measurements and gage height and discharge data for each will be published in the annual Water-Supply Papers of the United States Geological Survey, Parts VI to XII, respectively, for Missouri River and Snake River drainage areas.

ROADS

The road work in the park is in charge of Maj. Amos A. Fries, Corps of Engineers, United States Army, who has furnished the following notes on the work in the park under his department.

The sundry civil bill of July 1, 1916, appropriated money as follows for road work in Yellowstone National Park and the adjacent forest reserves on the east and south:

"Yellowstone National Park: For maintenance and repair of improvements, \$152,500, including not to exceed \$15,000 for maintenance of the road in the forest reserve leading out of the park from the east boundary, and not to exceed \$10,000 for maintenance of the road in the forest reserve leading out of the park from the south boundary, and including not exceeding \$5,000 for purchase, operation, maintenance,



and repair of motor-driven and horse-drawn passenger-carrying vehicles to be used for inspection of roads and road work, to be expended by and under the direction of the Secretary of War: Provided, That no portion of this appropriation shall be expended for the removal of snow from any of the roads for the purpose of opening them in advance of the time when they will be cleared by seasonal changes.

"For widening to not exceeding eighteen feet of roadway and improving surface of roads and for building bridges and culverts from the belt-line road to the western border from the Thumb Station to the southern border, and from the Lake Hotel Station to the eastern border, all within Yellowstone National Park, to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, \$33,700.

"For completing the widening to not exceeding eighteen feet of roadway and improving the surface of roads and for building bridges and culverts in the forest reserve leading out of the park from the east boundary, to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, \$6,000."

In addition there remained available on October 1, 1915, about \$13,000 of the \$195,000 appropriated for the same purposes in the sundry civil bill of March 3, 1915 (p. 9. report of acting superintendent, Sept. 30, 1915).

On account of early spring and the desire to expedite work in anticipation of record travel through the park during 1915, due to

The combined influence of the European war and of the San Francisco and San Diego Expositions, work was vigorously prosecuted during the spring and summer of 1915 under the appropriations for both the fiscal years 1915 and 1916, and consequently almost all crews had either exhausted their apportioned funds or completed their work prior to the date of the last report (Sept. 30, 1915).

The work during the present year included general repair and maintenance of the entire system, including the belt line, the north, west, south, and east approaches, both in the park and in the forest reserves on the east and south, and the Cooke City road; widening and improving the west, south, and east approaches, including the east forest reserve; sprinkling of 100 to 112 miles of belt line and north and west approach road; repair and construction of bridges; construction of concrete, wood, and galvanized-iron culverts; clearing of dead and fallen timber from the roadside; reshaping and ditching roads; maintenance of trees, shrubs, vines, and lawn.

In the following summary the work will be divided into that done on the belt line, the north approach, the west approach, the south approach, the east approach, and the Cooke City road.

BELT LINE

GENERAL ROAD REPAIRS.--Owing to the very heavy snows of the past winter and to the late spring, the road over the Continental Divide, between the Upper Basin and the Thumb, was still impassable on account

of snowdrifts as late as June 15, and would have remained so for the first part of the tourist season except for work done voluntarily on the part of the transportation companies and others in shoveling and otherwise breaking a trail through the snow. While this work served to render the road passable for horse-drawn vehicles for the first tourists on June 17, much sooner than would have been the case through the regular seasonal thaw, it also had the effect of permitting the passage of traffic through numerous snowbanks, the continuous melting from which kept the roadbed in wet and poor condition. That, combined as it was with restricting the travel to a narrow, single track, caused very severe rutting of the roadbed, and required considerable urgent repair work to keep the road from becoming impassable. The same was true of the Dunraven Pass road from the Canyon to Tower Falls, and of parts of the east approach road in the park, especially near Cub Creek, although both of these roads were not opened up until somewhat later than the Continental Divide road.

The spring run-off from the deep snows of the winter also caused some washing out of roads over certain stretches, especially along Spring and Dry Creeks between the Upper Basin and the Thumb, and required the constant attention of a small maintenance crew during the early part of the tourist season.

Early in July two flying-grader squadrons, consisting of about three graders each, with a few extra laborers, were sent in



opposite directions around the belt line, starting from Mammoth Springs. These crews shaped up the roads, repaired washouts, cleaned out ditches, and cleaned out and made minor repairs to culverts. In addition, a special crew was necessary to repair the 6 miles of road between Gibbon Meadows and Yellowstone Junction, which had become very badly broken up with ruts and chuck holes. Bad chuck holes between Mammoth Springs and the 15-mile post on the road to Norris were repaired by an emergency crew of about three men sent out from Mammoth Springs in a Ford touring car which was temporarily impressed into service as an emergency repair car.

To assist in maintaining the roads during the tourist season, each sprinkler crew was equipped with a split-log drag; and whenever rainy weather, which was rare during the season of 1916, gave an opportunity for so doing, these drags were used to reshape and smooth out the ruts in the roads. This process is very necessary and would have been more efficacious had there been more rain than was the case during the season just closed.

SPRINKLING AND DRAGGING.--During the tourist season of 1916 a maximum of 110 miles of road was sprinkled, covering practically the same stretches of road as the previous season, and including a portion of the north and west approaches. Although water for sprinkling purposes was plentiful early in the tourist season, continued dry weather during the summer caused some of the wells



from which water for sprinkling was drawn to go dry, so that toward the end of the season it was found necessary to abandon several sprinkler runs, as was the case in 1915. As already stated under "General road repairs," all sprinkler crews were equipped with split-log drags, which were used whenever rainy weather gave an opportunity for doing so, to reshape and smooth out the roads.

FIREHOLE RIVER REALIGNMENT.--This realignment, which will replace several miles of the road lying between the Madison Junction and the Firehole Cascades, was begun in June, 1915, and completed during the season of 1915 for a distance of about 3,500 feet. Work was resumed about the middle of July of this year, and up to the present time about 1,200 feet additional has been completed, making the total completed distance to date about 4,700 feet. This new location involves very heavy rock work, but it will greatly improve the grades and will open up a fine stretch of river scenery, replacing with an unusually attractive road one which is quite deficient in such qualities. The construction of this new road has been greatly assisted by the recent installation on the work of a $3/4$ -cubic yard revolving steam shovel, which will serve to materially reduce the cost of handling the rock material after being loosened by blasting. It is expected that the realignment, the total length of which will be about 7,650 feet, will be completed next season.

The first part of the paper is devoted to a discussion of the
 various methods which have been proposed for the determination of
 the rate of reaction between a radical and a molecule. The
 second part is devoted to a discussion of the various methods
 which have been proposed for the determination of the rate of
 reaction between a radical and a molecule. The third part is
 devoted to a discussion of the various methods which have been
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 various methods which have been proposed for the determination
 of the rate of reaction between a radical and a molecule.

GIBBON CANYON.--Two miles of the road along the Gibbon River, between the 15 and 17 mile posts from the west entrance toward Norris, was reshaped and regraded, including two short realignments (300 and 600 feet long, respectively) and the installation of about four corrugated-iron culverts.

VICINITY OF LAKE HOTEL.-- The first 5 miles of the road from the Lake Hotel toward the Canyon and the first several miles of the road from the Lake Hotel toward the Thumb was reshaped and regraded. Twenty-six corrugated galvanized-iron culverts, mostly of 24-inch diameter, were installed in connection with this work.

FREIGHT ROAD--LOWER GEYSER BASIN.--The freight road, 4 miles long, which parallels the main belt-line road between the Fountain Soldier Station and the Excelsior Geyser, having been closed by reason of the unsafe condition of the wooden truss bridge over the Firehole River, about 1 mile from the Fountain Soldier Station, it was found desirable to reconstruct the bridge in question, and also to generally put the road in shape for traffic. In addition to the reconstruction of the bridge already named, the trusses of which were so weak that they collapsed during the building of the new 50-foot bridge, there was also reconstructed the 40-foot bridge over Nez Perce Creek, in the immediate vicinity of the Fountain Soldier Station. The putting of this road into commission again makes possible deviating over it considerable heavy freighting traffic, thus reducing the wear on

the main road between the Fountain Soldier Station and Escalier Canyon, and furnishing a shorter route for freight traffic, and also gives opportunity for greater freedom in handling automobile traffic past the Fountain Canyon Basin without interference with the horse-drawn traffic.

ROADS AND SURFACING.--No resurfacing has been done on the belt line during the present season. Two automobile dump trucks were purchased and recently received, and are now in use on the west approach for hauling surfacing material there. In order to take advantage of the cheaper hauling costs, such surfacing as is contemplated on the belt line has been delayed until such time as these trucks will be free to do the work, as the expense of hauling is much less by truck than by team, and by the use of trucks it is therefore possible to surface well and at reasonable cost stretches of the road section which heretofore it has been impracticable to surface except with the poorer materials immediately at hand.

BRIDGES AND CULVERTS.--In line with the policy adopted several years ago of reconstructing in permanent materials the bridges and culverts on the main Belt line, there were built or installed this spring on the sections of road between the Park and the Lake and between the Lake and the Canyon, six reinforced concrete slab culverts, four of which were of 8-foot span and two of 7-foot span;

and one double corrugated galvanized-iron culvert, 24-inch diameter, with concrete head walls. All except two of the foregoing structures require to be back filled in order to be placed in commission. Concrete hand-rails were added to the 26-foot double-span reinforced concrete culvert built in 1914 over Otter Creek, about 2 miles from the Canyon Junction on the road to the Lake Hotel. There were also installed some galvanized-iron culverts at other parts of the Belt line, of 12, 18, and 24 inch diameter, as already noted in connection with the rescaping of roads in the vicinity of the Lake Hotel and between the 11 and 13 mileposts from Yellowstone toward Norris; but also in the replacement of small wooden and tile culverts at other parts of the Belt line where they had been broken down and rendered unserviceable by the heavy automobile truck traffic over them this season. In addition, a number of culverts and small wooden bridges were repaired, strengthened, or reconstructed, principally on the road between the Canyon and Tower Falls, many of these being partially or entirely broken down by the automobile traffic. The high steel bridge over the Gardiner River, on the road from Mammoth Springs to Tower Falls, was refloored with lumber.

GUARD RAILS.--Log guardrails were installed at the east approach of the Chittenden Bridge over the Yellowstone River, on both sides of the road.

NORTH APPROACH

On the north approach road, extending from the northern entrance at Gardiner, Montana, to the Belt line at Mammoth Hot Springs, general maintenance and repair work was done, as on the Belt-line road itself, and the first $3\frac{1}{2}$ miles from Mammoth Hot Springs toward Gardiner was sprinkled. The other mile and a half of the road has been treated with a light oil and sand finish in the spring of 1915 and did not require sprinkling during the season just closed.

GARDINER SLIDE.--The slide in the Gardiner Canyon, about 2 miles from the north entrance at Gardiner, Mont., which has given considerable trouble to the Gardiner Road for a number of years, was cut back in the fall of 1914 and the spring of 1915, so that at the beginning of the 1915 tourist season the road was broad and in very good shape. During the summer of 1915 and the winter following the slide gradually encroached upon the road, however, so that early this spring the roadway had been reduced to a width of about 9 or 10 feet. In addition to the old or main slide, the encroachment of which is gradual, there developed in the fall of 1915 a new or secondary slide, several hundred yards nearer Gardiner than the main slide. The slumping off of material at this new slide caused the road about $1\frac{1}{2}$ miles from the north entrance at Gardiner to be blocked several times during the fall

of 1915, and four times during March and April of the spring of 1916. By means of blasting and the use of graders, the road was reopened within a half day ordinarily after the occurrence of slides. In this work the quartermaster of Fort Yellowstone, Wyo., cooperated by furnishing teams and teamsters. In May the road at the main slide, which, as already stated, had become extremely narrow, was very much widened by blasting and grading, which process had to be repeated along portions of the slide once during the summer. Grader work was also required from time to time to smooth off the road surface, made necessary by the heaving up of the same due to the pressure from the slide above. Considerably more work will have to be done on the slide prior to the opening of the next tourist season.

RETAINING WALL.--Early in June a section of the concrete retaining wall which protects the road in the Gardiner Canyon gave way, being undermined by the high water in the Gardiner River, due to the melting of the very heavy snows of the preceding winter. The break was repaired without serious injury to the roadway by means of concrete and the free use of sand bags and steel rods. An adjacent section of the wall was weakened later in the summer by blasting operations in connection with the slide removal, but not so seriously as to make advisable any repair work during the tourist season. The wall will be placed in first-class condition during the present fall.

WEST APPROACH

On the west approach road, which extends from the west entrance at Yellowstone, Montana, to the Belt line at Madison Junction, a distance of $13\frac{1}{2}$ miles, maintenance work similar to that on the Belt line, including sprinkling the $3\frac{1}{2}$ miles nearest to Madison Junction, was done. In addition, the work of widening and improving the road to make it safe for animal-drawn and motor-propelled vehicles has been prosecuted as rapidly as possible since the funds for the fiscal year 1917 were made available early in July.

WIDENING AND GRADING.--During the year widening and grading of the west approach has been extended to include the entire distance from Yellowstone to Madison Junction, the work done this season covering about 2 miles between the 11 and 13 mile posts from the west entrance.

SURFACING.--During the season of 1915 oil-macadam surfacing, 18 feet wide, was completed for the first 5 miles of the approach, beginning at the west entrance. During the present season a crushed-rock sub-base, 5 inches deep and 10 feet wide, ready to be given an oil finish, has been constructed a distance of $2\frac{1}{2}$ miles, reaching as far as the bridge over the Madison River, about $7\frac{1}{2}$ miles from the west entrance. The narrowing of the oil macadam from 18 to 10 feet has been made because the experience to date has shown that practically all traffic on the west approach is

concentrated on the 10-foot strip, and the expense of the greater width in further construction on the west approach, at least for the immediate future, is not considered justified. To haul the oil for the oil finish there has been purchased a 1,000-gallon, asbestos-covered oil tank and distributor, which has recently been received and will be temporarily mounted, whenever necessary for oiling operations, on the White 5-ton truck purchased by the engineer department last year. This equipment will permit oiling of roads at considerable distances from the railroad without undue expense of hauling and without the necessity of reheating the oil en route. Two $5\frac{1}{2}$ -ton dump trucks have also been purchased to permit the more economical hauling of crushed rock and other surfacing material on this and other work in the park. Both trucks are for the present in use on the west road.

SOUTH APPROACH IN THE PARK

In addition to general repairs, such as were made on the Belt line, the work of widening and improving the south approach for combined horse-drawn and automobile traffic, as specially appropriated for by Congress, was continued.

REPAIRS AND GRADING.--The widening and grading of about $1\frac{1}{2}$ miles of road between 6 and 8 miles from the Thumb Soldier station, which was begun during the season of 1915, has now been finished, and, in addition, the road has been widened and graded for a distance

of about 4 miles over the Wintonstone Plateau, covering a stretch located between 17½ and 21½ miles from the Thurb Soldier station. This latter work has been extremely difficult, the plateau being strewn with large and small boulders, and has included several minor realignments where better grades and curves could thus be obtained, or where the road could be built more economically on the new location. In doing this work there was used to advantage a heavy power grader drawn by a steam roller acting as a tractor, both of which machines have been newly purchased this season. To complete the improvement of the south approach there is yet required the widening and grading of about 3½ miles of road (14½ to 17½ miles south of the Thurb). This work will probably be completed in time for the next tourist season.

BRIDGES AND CULVERTS.--The Horse Falls Bridge, about 1½ miles from the south entrance, was replaced, and two small log bridges were constructed, one about a mile north of the Thurb Soldier station and the other, a 12-foot span bridge, about 4 miles south of the Soldier station. In addition, repairs were made to other log culverts where necessary, and several small log and corrugated-iron culverts were installed in connection with the widening and grading work reported above.

REALIGNMENT 4 MILES SOUTH OF THURB.--A short realignment, 400 yards long, about 4 miles south of the Thurb, was constructed, including the 12-foot log bridge reported above.

SOUTH APPROACH IN THE FOREST RESERVE

SNAKE RIVER BRIDGE.--During the present season the steel-work was erected for the 100-foot span steel bridge over the Snake River, 2½ miles south of the park boundary, and the reinforced-concrete floor was also constructed. To complete this bridge there is still required the construction of two short log bridges at either end of the main bridge to form the approaches to the shores. These log bridges are just now being started. Owing to the very poor condition of the old wooden bridge over the Snake River, it is very urgent that the new bridge be placed in commission at the earliest possible moment.

DUGOUT REALIGNMENT.--A realignment, about seven-eighths of a mile long, between approximately 5 and 6 miles south of the park boundary, to replace the very bad stretch of road there known as the dugout, was constructed during the present season. This realignment includes the construction of a 70-foot span log bridge and of a number of small log culverts.

GENERAL REPAIRS.--In addition to the more important work in the south forest reserve already noted, considerable work of a general maintenance and repair nature was done to the first 7 miles south of the park boundary.

EAST APPROACH INSIDE THE PARK

GENERAL REPAIRS.--General repairs were made where necessary throughout the entire 26 miles of the east approach inside the

park. As already stated under the work on the Belt line, constant attention was required early in the tourist season to keep the east approach passable, owing to the melting of snow-banks and to the single, narrow track which had been opened through the snow and to which traffic was for the time being restricted.

BRIDGES AND CULVERTS.--The so-called Loop Bridge, east of Sylvan Pass, was replaced by a 25-foot span wooden bridge and a large rock fill at the west abutment of the bridge. The bridge over Pelican Creek was refloored, and numerous other smaller bridges and culverts received repairs made necessary by the heavy run-off from the winter snows and by the traffic of automobile trucks and of the heavy transportation autos entering the park from the Cody entrance. There were also installed a number of galvanized-iron culverts in connection with the widening and grading work hereafter described.

WIDENING AND GRADING.--The work of widening and improving the road to make the same safe for both animal-drawn and motor-propelled vehicles under the special appropriation for this purpose was resumed as soon as the new funds became available in July. The work done during the present season consisted of widening, reshaping, and regrading about $1\frac{1}{2}$ miles of road just east of Sylvan Pass. The improvement of the east approach has now been brought to completion on all except about $3\frac{1}{2}$ miles of the road, between the 9 and 13 mile posts from the Lake Junction. Of this $3\frac{1}{2}$ miles, a

distance of $1\frac{1}{2}$ miles, between the $9\frac{1}{2}$ and 11 mile posts, had been previously partially widened and improved, and work is now being begun to complete the entire section of $3\frac{1}{2}$ miles.

EAST APPROACH IN THE FOREST RESERVE

WIDENING AND GRADING.---The work of improving the road in the East Forest Reserve to make the same safe for both animal-drawn and motor-propelled vehicles under the special appropriation for the purpose was resumed in July, and during the present season the $2\frac{1}{2}$ miles between the 5 and $7\frac{1}{2}$ mile posts from the park boundary was widened and graded, thus completing the work of widening and grading for the entire $27\frac{1}{2}$ miles of the road.

STEEL BRIDGES.---Work has been continued on the steel bridge, 100-foot span, over the North Fork of the Shoshone River, $2\frac{1}{2}$ miles from the park boundary, and on a similar bridge over Elk Fork, 23 miles from the park boundary. Both of these bridges, as well as one over the North Fork, $21\frac{1}{2}$ miles from the park boundary, were begun in 1915. During the past year the reinforced-concrete floor of the Elk Fork Bridge was constructed, leaving only the approaches yet to be built for this bridge. At the North Fork Bridge $21\frac{1}{2}$ miles from the park boundary, the erection of the steelwork and the construction of the reinforced-concrete floor and of the approaches remain yet to be done. The steelwork of the bridge over the North Fork, about $2\frac{1}{2}$ miles from the park boundary, known as the Pahaska Bridge, was erected during the year, and the

approaches were constructed. This bridge is now complete except for the construction of the reinforced-concrete floor, which it is expected will be constructed the present fall.

GENERAL REPAIRS.--General repairs were made to the road in the East Forest Reserve wherever required, including minor repairs to log bridges and culverts. The road was repaired and reshaped more extensively between the park boundary and Pahaska, about $2\frac{1}{4}$ miles from the boundary.

COOKE CITY ROAD

BRIDGES AND CULVERTS.--Fourteen galvanized-iron culverts and one log culvert were installed on the road leading from Tower Falls Soldier Station to the northeast boundary of the park, between the Lamar River bridge and the Buffalo Park, about 4 and 12 miles, respectively, from the Tower Falls Soldier Station.

TWO LINES REALIGNMENT.--During the present year there has been constructed a realignment, about 3 miles long, of the road just east of the crossing of the Yellowstone River. This realignment, which passes to the south of the so-called Black or Junction Butte, replaces a portion of the road which was replete with bad grades and curves, and some parts of which, during the spring of the year, have at times been all but impassable because of the mud. The work included the installation of a number of galvanized-iron culverts.

WORK BY ROBERT I. MCKAY.--The work done by Mr. Robert I. McKay and associates, who have mining interests at Cooke City, Montana, about 4 miles outside the northeast boundary, was continued last fall until interrupted by the closing in of the winter season. Mr. McKay and his associates are interested in the upkeep and improvement of the road for the benefit of their motor trucks and trailers. For the operation of which between Cooke City and Gardiner, Montana, for the hauling of ore, Mr. McKay has a permit from the Interior Department. The work done last fall by these interests, after September 30, included a very desirable realignment between Fish and Pebble Creeks, obviating the extremely bad grades of the old road, and the construction of two short realignments between the Soda Butte Soldier Station and the Jackson Grade. Some light graveling was also done on portions of the road. During the present spring Mr. McKay reconstructed the log bridge over Pebble Creek, which was originally constructed by him in 1915, and the center pier of which was undermined by the high waters of this spring.

FISH

Mr. W. T. Thompson, superintendent of the United States fish hatchery at Bozeman, Montana, who also has charge of the summer station on Yellowstone Lake in the park, reports a fairly successful harvest of black-spotted trout eggs, although his work

was hindered to some extent by snow and floods, due to melting of the heavy snows in the early part of the season, and later by the dry, warm weather which lessened the stream flow so as to materially shorten the run of the spawning fish. He also complains of considerable interference by the bears, which were very plentiful and were the source of many complaints during the summer. He reports, however, that notwithstanding these handicaps his total harvest for the summer amounted to 7,435,800 trout eggs, which was nearly 2,000,000 more than the previous year. As usual, most of these eggs were "eyed" and shipped to county, State, and Federal hatcheries throughout the United States, but about 200,000 of them that were taken early in the season were hatched out for restocking purposes in park waters.

The fish hatchery is located close to the Lake Hotel and some of the permanent camps and is of great interest to tourists, who are always welcome to observe and to whom an attendant is always ready to explain the workings of the hatchery.

The eggs that were hatched were planted in Clear Creek, Columbine Creek, Pelican Creek, and Bridge Creek, tributary to Yellowstone Lake, and 60,000 were sent out to be planted in Buffalo Park of Slough Creek, but did not stand the trip and died before reaching their destination.

Seventeen thousand young eastern brook trout furnished by the United States fish hatchery at Bozeman, Montana, were planted

in Nez Perce Creek on June 30.

WILD ANIMALS

Due to natural conditions, and the fact that wild animals have been protected for many years, the park is rapidly becoming known as the largest wild bird and animal preserve in the United States, if not in the world. In addition to 194 varieties of birds, including many varieties of waterfowl, that have been observed and recorded in the park, antelope, deer (both black-tailed and white-tailed), elk, moose, wild buffalo, bears, mountain sheep, coyotes, gray wolves, and mountain lions are notable, and many of the smaller animals such as beaver, foxes, lynx, otter, marten, mink, marmots, skunks, red squirrels, chipmunks, weasels, badgers, porcupines, etc., are numerous.

ANTELOPE

Most of the antelope winter in one herd near the north line of the park and are held from leaving to the lower country outside by the high woven-wire fence extending from the mouth of Gardiner River west to Sepulcher Mountain. The antelope, together with the deer and mountain sheep, were fed hay during the winter; 193½ tons that was on hand from the alfalfa field near the north entrance was so fed, and as this was not sufficient, due to the very severe winter, about 7 tons additional of baled hay was purchased for the

purpose. Improvements were made of the alfalfa field as follows: About 15 acres were fertilized and the loose surface rock picked off. About 35 acres were disked, reseeded in bare spots, and dragged. The work of irrigating the field, cutting, curing, and stacking the hay, was again done by contract, at a cost of \$5 per ton for the hay in stack. About 120 tons, from two cuttings of the field during the past summer, are on hand for the coming winter.

DEER

Both the black-tailed and white-tailed varieties are very tame and seem to be thriving. The black-tailed deer are quite numerous, and many of them, like the elk, doubtless stray outside of the park and are killed by hunters in the open season.

ELK

The snow was very deep and winter very severe throughout the park, and due to this fact the elk, which are by far the most numerous of any kind of game in the park, came down to the lower levels in immense herds in January, February, and March, so that the matter of capturing them for shipment was a comparatively easy one, and there was no trouble in securing all that were wanted for shipment. The unusual number of elk, antelope, deer, and mountain sheep in the immediate vicinity of the northern entrance

also attracted many winter visitors. The Northern Pacific Railway Co. ran several special excursion trains to Gardiner from Montana points during January and February, and a total of about 1,992 tourists made special trips to see the game. As high as 7,000 elk were counted between Fort Yellowstone and a point about a mile west of Gardiner--most of them along the main road--on January 27, a day when the weather was particularly severe.

On account of the very severe weather it was predicted that the loss of game during the spring months would be great, but this prediction did not prove true, and the men who in April made a careful census of the elk reported but few dead animals found, and that most of them were in excellent condition. Due to the deep snows and a rather late spring the elk remained down in the valleys and lower altitudes much later in the spring than usual. Under authority of the department shipments of 618 head of elk were made during the winter, as follows:

Pennsylvania-----	100	Utah-----	50
Alabama-----	50	Louisiana-----	40
Texas-----	20	New York-----	50
Minnesota-----	2	Idaho-----	50
Colorado-----	50	Washington-----	50
Georgia-----	2	Montana-----	50
Department of Agriculture---	100	North Dakota-----	4

Under authority of the department dated February 15, 1916, representatives of the United States Biological Survey and of the United States Forest Service of the Department of Agriculture were in the park March 2 to 14, inclusive, taking a census of the elk

and studying their winter conditions, and such assistance as was practicable was given them here. A copy of their complete report has not been furnished this office.

In accordance with instructions from the department, beginning April 5, 1916, a very careful census was made of the elk belonging to the northern herd in the park and just along its borders outside on the north and northeast; 29,544 elk were found in this herd and 1,958 more were accounted for--namely, 1,000 (estimated) killed in adjoining States during the open hunting season, 611 shipped from the park under authority of the department, 90 shipped from just outside of the park by the authorities of Montana to other points in the State, and 257 counted that had been killed for their teeth in the State of Montana not far from the park line after the close of the open hunting season. An unusual increase in the Jackson Hole herd south of the park, as found by the representatives of the Department of Agriculture referred to above, indicated that a number of the northern herd had probably migrated to the southern herd during the past year.

The severe storms of the last days of December and the month of January drove the elk out of the park in large herds. Certain lawless individuals took advantage of this opportunity and slaughtered them recklessly. The section of Montana where the unlawful killing of elk took place is a strip of rough country from 12 to 15 miles

long, measured in the direction of the northern boundary line of the park and extending northerly to a width of 8 miles, lying wholly without the park and embracing the country about Gardiner and Jardine.

The hunting season in Montana closed December 15, 1915, and there were no elk reported outside the park in the section under consideration at that time. So the slaughter took place during the closed season. A fairly careful search by park scouts of the strip of country above mentioned resulted in the finding of the bodies of 257 elk which had been killed for their teeth.

During the past summer more elk than usual have been seen along the traveled roads, and patrols who have seen them in large herds at higher levels state that there are an unusual number of young with the cows.

MOOSE

Moose are so timid and are so much scattered in many sections of the park that it is practically impossible to get a reasonable estimate of their numbers, but they are frequently seen in small herds, and there is little doubt that they have been on the increase for several years under the protection afforded them by the park and the adjoining States. Last season the State of Wyoming sold special licenses to kill one bull moose to each licensee during the open season, and limited the number to 50. I am informed

that those who bought such licenses had no difficulty in securing their moose.

BUFFALO

WILD HERD.--In July and August a special attempt was made to look up the wild buffalo in the park. Their condition was found very satisfactory. Seventy-two in all were found, of which 10 were this year's calves.

HOME HERD.--The main herd is kept on Lamar River, near the mouth of Rose Creek, 30 miles east from headquarters. This herd now numbers 276 animals, as follows:

	Males	Females	Total
Number Oct. 1, 1915 (last report).....	122	117	239
Born summer of 1916.....	<u>34</u>	<u>22</u>	<u>56</u>
Total to account for.....	156	139	295
Died or disposed of during the year.....	<u>10</u>	<u>9</u>	<u>19</u>
Balance now in the herd.....	146	130	276

Of those disposed of, one 5-year-old bull and one 6-year-old bull were shipped to Corpus Christi, Tex.; two 2-year-old bulls and four 3-year-old cows to Wind Cave National Park; one 6-year-old bull to Kansas City, Mo.; and one 4-year-old bull to Denver, Colorado, all donated by the department but shipped at the expense of

of the parties receiving them. An 8-year-old cow and a 4-year-old bull were killed by fighting among the herd. The young cows that were not in very good condition got into a swamp and were not strong enough to extricate themselves. One of the oldest bulls in the herd was killed, apparently by a poisonous weed; and an old cow died in the same manner and her calf was raised on one of the domestic cows kept for that purpose. A 4-year-old cow was drowned in an irrigation ditch in the lower field. An old bull that was not in good condition was gored to death by the others while they were being "rounded up." A male calf that was born late last fall, and had never been in good condition, also died.

In the cases of those that died, whenever practicable, the heads, skins, skulls, etc., were saved and shipped to the National Museum as specimens.

Sixteen of the old bulls were brought in to Mammoth Hot Springs on June 15, where they were held during the tourist season as a show herd.

About 250 tons of excellent hay was cut and stacked at the buffalo farm on Lamar River for winter use of the tame buffalo herd. The cost of cutting and stacking this hay was about \$4.72 per ton, plus the work of the regular employees and the 4-horse work team used at the buffalo farm. About 400 rods of the seven-wire fence around the upper field on Rose Creek was

rebuilt and minor repairs made to the balance of the fence. The roofs and trimmings of the log buildings were painted, the work being done by regular employees.

Due to the increasing herd of buffalo, it will be necessary to plow up, fence, seed, and irrigate additional land for meadows, and arrangements are being made to do this late this fall or early next spring. The buffalo are grazed in the open as much as possible. It was necessary to feed hay beginning January 13 last winter.

A veterinarian of the Department of Agriculture visited the park and vaccinated the young buffalo for hemorrhagic septicemia early in December.

Bears

X, Many complaints were received during the summer of destruction by bears, which were particularly plentiful and very much in evidence during the tourist season throughout the park. Many of these that live around the camps in summer eat mischievously, and as they grow older they become bolder and finally are positively dangerous and eventually have to be killed. Six black bears and two grizzlies have been killed for this reason during the past season; one small black cub, with a can stuck on its foot, was killed to prevent further suffering, and two small black bears died near headquarters from unknown causes.¹ One tremendous grizzly bear attacked and

X.

injured two men asleep in camp near Indian Pond, on the Cody Road north of Yellowstone Lake, about the middle of August. Efforts were made to locate and kill this bear, but without success. On the evening of September 7 three men in the employ of the United States Engineer Department were in camp on the Cody Road about 10 miles east from the outlet of Yellowstone Lake. They were attacked in the middle of the night, apparently without provocation, by a bear, which was probably the same one referred to above, and one of their number, Frank Welch, of Electric, Montana, was dragged some distance and so badly mauled and injured that he died a few days later in the hospital at Fort Yellowstone.

3 Efforts were again made to kill this bear, and on the evening of September 8 a very large grizzly, believed to be the same one, was killed by exploding a charge of dynamite under him by means of an electric battery. //

Bears were captured and shipped from the park under authority of the department as follows: On August 10 a pair of grizzlies, male and female, 2 to 3 years old, to the park commission at Virginia, Minnesota. The same date a pair of yearling brown bears, male and female, to Madison Zoological and Aquarium Society, Madison, Wis., and a young female grizzly to the commissioner of sanitation, San Antonio, Texas. A young male

grizzly was also sent to San Antonio, Texas, on September 26. These shipments were all made at the expense of the cities receiving the bears.

COYOTES AND WOLVES

Coyotes are numerous. From October 6, 1915, to June 30, 1916, two special rangers were employed by advice of the United States Biological Survey for the purpose of exterminating carnivorous animals in the park. They succeeded in shooting and trapping 83 coyotes, 12 wolves, and 4 mountain lions. The skulls and such of the skins as were desired as specimens were sent to the National Museum, and the other skins were sold and the money deposited to the credit of the park revenues. Other park employees succeeded in killing 97 coyotes, making a total killed of 180. Two young male wolves captured in the spring of 1915 by the employees at the buffalo farm were shipped alive on November 16 to the National Zoological Park.

MOUNTAIN LIONS

Mountain lions are quite in evidence during the winter, when their tracks are found in the vicinity of the large herds of elk. Four were trapped and killed last winter.

MOUNTAIN SHEEP

The mountain sheep wintered in excellent condition. Signs of sheep scab were noticed on three of them in Gardiner Canyon, and plans were made to dip them, but by the time the arrangements were completed they had gone so far back in the mountains as to make it impracticable to capture them, and later reports indicated that those that were apparently diseased were much improved as the spring advanced and grass was available.

BIRDS

A number of new names were added to the list of birds observed in the park through the observations of Mr. M. P. Skinner, who made the original list, until it now totals 194 varieties. Several of the varieties of water birds are found in the park the year round, as there is plenty of open water in winter due to hot springs and geysers.

PROTECTION OF GAME

Extra rangers were employed during the open season for hunting in the adjoining States in order to protect the park boundaries from hunters who might purposely or accidentally stray over the line. The supervisors and other employees of the national forests adjoining the park, as well as the State game authorities, cooperated with the park

authorities in protecting game, and several important arrests were made and convictions secured.

On June 28, 1916, an act of Congress was approved amending the act of May 7, 1894, to protect the birds and animals and to punish crimes in the park so as to provide a maximum penalty of \$500 or six months' imprisonment, or both, and costs, instead of \$1,000 and two years as heretofore. This change will greatly simplify the matter of trials for offenses in the park, as under the original law the United States commissioner in the park was not authorized to dispose of cases that came before him, but could only have a hearing, and if the facts justified, hold the offenders to trial before the United States district court, which made the proceedings tedious and often very expensive for the Government.

Seventeen snowshoe cabins were repaired and supplied for winter use of patrols.

VIOLATIONS OF LAW

The highway robber who held up the coaches near Madison Junction on July 9, 1915, has not been apprehended. Edward B. Trafton was tried in the United States district court in Cheyenne, Wyoming, in December, 1915, and found guilty of holding up the coaches in the park on July 29, 1914. He

is now serving a five-year term in the United States prison at Leavenworth, Kansas.

Most of the cases of persons found hunting in the park during the open season in adjoining States were apparently accidental, due to ignorance of the whereabouts of the park line, which is not always well marked, and in rough country is sometimes hard to find. The cases of apparent willful violations of law in regard to hunting occurred mostly during the closed season in the adjoining States by professional hunters.

SANITATION

During the tourist season frequent inspections of hotels and camps were made by officials of the Interior Department and officers of this command.

During July Mr. J. A. Hill made a special inspection of hotels and camps to determine the quality and manner of handling of food supplies. An inspection of the manner of slaughtering and handling the meat supply in the park was made September 6-8 by an expert from the Department of Agriculture on request of the Interior Department.

Two men with a 2-horse team and wagon were kept on the move all summer keeping the camping grounds in a sanitary condition and caring for the earth closets maintained for public use throughout the park.

Special sanitary camps for parties traveling in private automobiles and carrying their own camp equipment, located at Mammoth Hot Springs, Upper Geyser Basin, Grand Canyon, and Lake Outlet, were constructed in the early part of the summer. These camps consist of a large shed for housing of automobiles, with a capacity of 12 cars at each point, toilets for men and women, and cooking grates. Dry wood is provided at each place, and at Mammoth Hot Springs electric lights and running water are also provided, all without charge to the tourist. These facilities were appreciated and should be improved upon and the sheds changed to provide for increased travel.

FOREST FIRE

The latter part of the season was very dry and special attention had to be given to fire patrols.

A forest fire was reported at Upper Geyser Basin, about 500 yards east from Old Faithful Geyser, on August 2. It was controlled by the soldiers stationed at that point, assisted by employees of the near-by permanent camps, after it had burned over about 3 acres. It was kept under control by the soldiers for several days until finally extinguished by a hard rain. It was probably started by a picnic party.

On the afternoon of August 25 a small fire was reported about 7 miles south from Fort Yellowstone and about a mile from the main road. One scout and a detachment consisting of a noncommissioned officer and 10 soldiers were sent out and succeeded in extinguishing it the same evening before much damage was done, although it smoldered and had to be carefully watched for several days afterwards. About half an acre was burned over. The cause of this fire was not determined.

On the evening of September 18 a forest fire broke out on Cougar Creek, about 5 miles from Riverside Station, in down timber and jack pines. Such men as could be spared from a road camp in that vicinity assisted the men from Riverside Soldier Station in extinguishing it after it had burned over about 4 or 5 acres. Under a high wind it broke out again on September 21 and spread rapidly. The men from the road crew were again called upon, and 35 soldiers from Fort Yellowstone, under a commissioned officer, were sent out to fight the fire. The following day the number of soldiers was increased to 70 men, and the fire was well under control by the morning of September 25 and was extinguished completely by a hard storm ending in snow on September 26 and 27. This fire burned over a strip about 2 miles long and in places a half mile wide, but no material damage was done, as the burning was mostly in down

timber and jack pines and in willows in the bottoms along the stream located several miles from the main road.

TERMINALS

Four sanitary automobile camps were established at Mammoth Hot Springs, Upper Geyser Basin, Outlet of Yellowstone Lake, and Grand Canyon. At each camp was constructed a shed 60 by 32 feet, 8 feet high at the eaves, frames built of poles cut in the park and covered with 22-gauge corrugated steel roofing, painted. The sheds are divided by rows of supporting posts into six double stalls each 32 by 10 feet, each stall to hold two automobiles, making a total capacity of 12 automobiles to each shed. The sheds cost an average of \$292.61.

NATURAL PHENOMENA

No notable permanent changes were recorded in the action of the geysers and hot springs during the year. Many of them appeared to be more active than usual for a few weeks in the early part of the summer, due to the increased amount of surface water from the exceedingly heavy snows of last winter.

Hyson Terrace, one of the most beautiful of the terraces at the Mammoth Hot Springs, dried up last fall, but started up again the latter part of February and was fairly active until nearly the close of the tourist season, when it dried up again

and has broken out in a new place just above the old terraces.

A double vent geyser broke out at the Thumb of the Lake early in May, and at first played every 2½ hours to a height of from 75 to 100 feet, but it gradually dwindled and quit playing entirely the latter part of July.

Under special permit of the department a few parties visited the park during the past winter for the purpose of taking moving pictures of game, and several others visited the park during the summer season for the purpose of securing moving pictures.

Assistant to the Secretary of the Interior, Hon. Stephen T. Mather, and party visited the park officially from July 22 to July 31. The Superintendent of National Parks, Mr. Robert B. Marshall, was in the park from September 3 to 14. Mr. Horace M. Albright, assistant attorney, Interior Department, was in the park September 13 to 16.

The orders from the War Department direct that the military force now guarding the park be withdrawn, Fort Yellowstone abandoned as a post, and the administration of the park transferred to the Interior Department, effective October 1, 1916.

The Interior Department is organizing a ranger force to replace the troops.

In 1886 troops of the Cavalry Arm of the military service marched into the park, pitched camp, and took up the important

duties of making this magnificent reservation a pleasant place for people to visit and a home for the wild game. Many officers and men look back upon their service here with the keenest pleasure. Their duties have been well and creditably performed, and the 30 years of military control will be honorable ones in the history of the Yellowstone National Park.
